

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of Part 2 of the Commission's Rules)	ET Docket No. 00-258
to Allocate Spectrum Below 3 GHz for Mobile and)	
Fixed Services to Support the Introduction of New)	
Advanced Wireless Services, including Third)	
Generation Wireless Systems)	
)	
Petition for Rulemaking of the Cellular)	
Telecommunications Industry Association)	RM-9920
Concerning Implementation of WRC-2000:)	
Review of Spectrum and Regulatory Requirements)	
)	
Amendment of the U.S. Table of Frequency)	
Allocations to Designate the 2500-2690/2670-2690)	RM-9911
MHz Frequency Bands for the Mobile-Satellite)	
Service)	

COMMENTS OF MOTOROLA, INC.

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Summary

Motorola strongly supports the Commission's efforts to identify new spectrum below 3 GHz for allocation to third generation ("3G") wireless services. Given the tremendous growth in demand for wireless voice and data services and the phenomenal surge in Internet usage, the demand for 3G wireless services, which will marry the benefits of these two technologies, will be exceedingly high in the United States. Allocation of additional spectrum for 3G is essential to enable its rapid development. According to recent estimates, the number of 3G wireless subscribers will rise from zero today to 100 million in 2005 – as fast as the growth of the Internet over the past decade. Motorola agrees with the ITU estimate that more than 160 MHz of spectrum will be needed to support the development of 3G in the next decade alone.

There is a pressing need for the Commission to move swiftly to license new 3G wireless spectrum. To date, developments in Europe and Asia have outpaced the efforts to allocate and license spectrum for 3G services in the U.S. This may impact the competitive standing of U.S. companies in the global markets for 3G goods and services. As concluded by the President's Council of Economic Advisors, "[T]o promote a domestic cluster of internationally competitive wireless firms, it is essential that adequate spectrum be made available for commercial use."

Motorola believes that the FCC should allocate the 1710-1850 MHz and 2110-2150/2160-2165 MHz bands for advanced terrestrial 3G services. This would provide an additional 185 MHz of spectrum within the U.S. and thus satisfy the ITU's recommendations. While the 2500-2690 MHz is highly desirable mobile spectrum, Motorola does not believe that it offers the same near term potential for global spectrum harmonization as does the 1710-1850 MHz band, which is now widely used globally for 2nd generation systems.

Motorola notes that the 1710-1850 MHz band, including the 1710-1755 MHz portion that has already been transferred for new non-Government uses, is extensively used by a number of Government operations that, under existing law, are scheduled to remain in the band indefinitely. Motorola believes that it is feasible to develop a sharing and relocation strategy that could make most of this spectrum available for the accommodation of 3G services while, at the same time, meeting the needs of the Government users. However, the current auction system, where the true costs of relocating incumbents only becomes known to successful bidders *after the auction*, threatens the effective deployment of advanced wireless communications systems in a timely fashion. The U.S. must develop a regulatory structure whereby the proceeds from the relevant auctions are used to fund the relocation of affected incumbent operations. Motorola intends to work with Congress, the FCC and NTIA on these issues during the coming months.

Motorola believes that the U.S. will benefit greatly from a 3G pairing that, in part, is entirely contained within the 1710-1850 MHz. Motorola therefore recommends that the FCC pair the 1710-1755 MHz (mobile station transmit) with the 1800-1845 MHz band (base station transmit). Such an allocation would provide substantial harmonization with DCS-1800 allocations used throughout the world. In addition, Motorola also recommends that spectrum from the 1755-1780 MHz band (mobile station transmit) be paired with the 2110-2150/2160-2165 MHz band (base station transmit). This pairing provides additional global spectrum harmonization with both DCS-1800 and the 3rd generation UMTS band plans. During the course of these proceedings, Motorola will continue to evaluate all relevant band plan proposals considering factors such as spectrum efficiency, band sharing feasibility with incumbent users, and the cost and complexity implications of duplex spacing and multi-band operations.

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COMMENTS OF MOTOROLA, INC.

Motorola hereby submits these comments on the *Notice of Proposed Rulemaking* ("NPRM") in the above-captioned proceeding.¹ Motorola strongly supports the Commission's efforts to identify new spectrum below 3 GHz for allocation to third generation ("3G") consumer wireless services. The tremendous growth in demand for wireless voice and data services has mirrored the phenomenal surge in Internet usage. Given these trends, the demand for 3G wireless services, which will marry the benefits of these two technologies, will be exceedingly high in the

¹ Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *Notice of Proposed Rulemaking and Order*, ET Docket No. 00-258 (rel. Jan. 5, 2001) ("NPRM").

United States. Motorola urges the Commission to allocate sufficient new spectrum to meet the estimated demand for consumer wideband services. Moreover, Motorola urges the Commission to allocate spectrum in a manner that achieves the maximum practicable degree of harmonization between domestic and international spectrum. To this end, Motorola believes that the 1710-1850 MHz and the 2110-2150/2160-2165 MHz bands offer the greatest near term potential for promoting these goals.

I. Introduction

3G wireless services represent the convergence of two of the fastest growing sectors of the U.S. economy – wireless services and the Internet. Since the award of the first cellular telephone license in 1983, subscribership for wireless services has risen dramatically. In the mid-1990's, the development of digital cellular technologies provided consumers with new features such as caller ID and voicemail and led to the creation of second generation ("2G") Personal Communications Service ("PCS"). The additional competition provided by 2G providers has also led to lower per-minute prices and an acceleration in the growth of wireless subscribers. In 2000, the industry passed the 100-million customer mark. Today, the Cellular Telecommunications and Internet Industry Association ("CTIA") estimates that there are more than 110 million wireless subscribers in the United States,² representing a penetration rate of forty percent. Consumers have adopted wireless technology at a far faster pace than prior landmark technological developments, such as the (wireline) telephone and the television.

² See http://www.wow-com.com/consumer/faqs/faq_general.cfm.

The growth of the Internet has been even more explosive. As recently as 1994, there were only three million users, mostly in the United States.³ By mid-1999, more than 100 million American adults were using the Internet.⁴ Today, more than 135 million Americans are online, and analysts predict that number will grow to more than 200 million in 2005.⁵ Worldwide, more than 400 million people are now accessing the Internet and that number is expected to grow dramatically, to more than 1.1 billion users in 2005.⁶

Wireless Internet, the convergence of these technologies, is in its infancy. Using Wireless Application Protocol (“WAP”) or i-mode technology, 2G wireless providers are currently providing low-data rate (usually at rates of 9.6 or 19.2 kbps) access to the Internet from mobile handsets. Existing 2G services are also capable of providing other wireless data services, but again, functionality is restricted by the low data rates presently offered.

3G wireless services provide the means of achieving greater functionality of wireless Internet and providing broader bandwidth mobile data services for consumers. International Mobile Telecommunications-2000 (“IMT-2000”), the initial standard for 3G wireless services adopted by the International Telecommunication Union (“ITU”), calls for data rates of up to 2 Mbps for indoor traffic, 384 kbps for pedestrian traffic, and 144 kbps for high-speed vehicular

³ See U.S. Dep’t of Commerce, *Digital Economy 2000*, introduction (2000).

⁴ See *U.S. Internet Breaks the 100 Million Mark*, The Strategis Group Press Release, Nov. 9, 1999, available at <http://www.strategisgroup.com/press/pubs/iut99.html>.

⁵ See *Internet users will surpass 1 billion worldwide in 2005*, Feb. 7, 2001, available at <http://www.europemedia.net/shownews.asp?ArticleID=1396>.

⁶ See *id.*; *How Many Online?*, available at http://www.nua.ie/surveys/how_many_online/index.html.

traffic.⁷ Other key features of the IMT-2000 standard are interoperability between wireless systems of different operators, which will facilitate global roaming; common billing and user profiles; geographic positioning capability; and support for multimedia services, including bandwidth upon demand and asynchronous data transmission.⁸ By providing broader bandwidth capability, 3G wireless services will offer consumers high-speed wireless Internet access, mobile video conferencing, wireless email, and multimedia capability. In addition, the “always-on” feature of the IMT-2000 platform will greatly facilitate wireless Internet use. These key attributes of 3G wireless services will enable the proliferation of a new form of electronic-commerce: mobile-commerce (or “m-commerce”), which will allow consumers to obtain information, make bookings and purchases, and conduct transactions through a wireless handset.

The economic implications of the development of 3G wireless services is likewise expected to be dramatic. The Council of Economic Advisers (“CEA”) reports that economic studies show a “consumer surplus” of \$53-111 billion in 1999 from first and second generation wireless services.⁹ The CEA anticipates that the broad range of 3G applications will generate similar annual economic benefits for consumers.¹⁰ With regard to the potential benefits for wireless providers, the CEA observes that “U.S. wireless operators earned \$238 million of revenue per MHz under existing spectrum allocation in 1999. At similar rates, an additional 150 MHz of spectrum could bring an additional \$35.7 billion of service revenues per year, depending

⁷ See ITU-T Recommendation Q.1701, Geneva, <http://www.itu.int/itudoc/itu-t/rec/q/q1000up/index.html>.

⁸ See *id.*

⁹ See The Council of Economic Advisers, *Economic Impact of Third-Generation Wireless Technology*, Oct. 2000, at 6.

¹⁰ See *id.* at 8.

on what services are provided.”¹¹ Of course, if more spectrum below 3 GHz is allocated to 3G wireless services, the potential economic benefits would be even greater. Finally, the CEA notes that a further benefit of developing 3G service is the potential to “unleash a wave of secondary innovations in related goods and services, and to foster the development of new “technology corridors” such as Silicon Valley.”¹² In sum, the economic benefits flowing from the licensing of 3G wireless services are expected to be significant and broad ranging.

II. The Expected High Demand for 3G Services Necessitates a Sufficient Allocation of Spectrum Below 3 GHz

Allocation of additional spectrum for the provision of 3G wireless services is essential to enable the rapid development of these services. According to recent estimates, the number of 3G wireless subscribers will rise from zero today to 100 million in 2005¹³ – as fast, or even faster, than the growth of the Internet over the past decade. 3G wireless subscribership is expected to climb rapidly to more than 600 million subscribers by 2010.¹⁴ Total wireless subscribers, including cellular and PCS services, are expected to reach the 1 billion level by year-end 2002 and exceed 1.6 billion by 2010.¹⁵

These estimates reflect the revolution that the broader bandwidth capability of 3G wireless services will bring to the consumer wireless Internet market. The availability of high-speed

¹¹ *Id.*

¹² *Id.* at 11.

¹³ See *Enabling UMTS/Third Generation Services and Applications*, UMTS Forum Report No. 11, Oct. 2000 [hereinafter *UMTS Report No. 11*] at 12, available at <http://www.umts-forum.org/reports.html>.

¹⁴ See *id.*; *The UMTS Third Generation Market – Structuring the Service Revenues Opportunities*, UMTS Forum Report No. 9, Sept. 2000 [hereinafter *UMTS Report No. 9*] at 9, available at <http://www.umts-forum.org/reports.html>.

¹⁵ See *UMTS Report No. 11* at 26; see also <http://www.wow-com.com/consumer/faqs/>

mobile Internet access will cause a surge in consumer demand for 3G wireless services, in much the same way that demand for high-speed DSL and cable modem Internet access has soared over the past year.¹⁶ Analysts now predict that wireless Internet use in the U.S. will expand from a mere 2 million subscribers today to 83 million in 2005.¹⁷ Over this same timeframe, the proportion of users accessing the Internet from a wireless device, such as a mobile handset or a personal digital assistant (“PDA”), will increase from 1.3% to almost 40%.¹⁸ The overall U.S. market for wireless data services will expand from 5 million subscribers today to 172 million in 2007, which will represent a penetration rate of nearly 60%.¹⁹

Expectations for global demand for wireless Internet and wireless data are considerably greater. By 2005, analysts predict that there will be 730 million wireless Internet subscribers, representing more than 60% of all Internet users.²⁰ In Western Europe, more than two-thirds of Internet users are expected to be accessing the Internet via wireless devices.²¹ In many countries, wireless Internet service will provide the primary means for accessing the Internet.

faq_general.cfm (predicting 1.26 billion wireless subscribers by 2005).

¹⁶ Residential high-speed Internet access grew at a rate of 230% in the U.S. in 2000 and is expected to garner 36 million subscribers by 2005, surpassing dial-up access. *See Residential High-Speed Access to Surpass Dial-Up by 2005*, The Strategis Group Press Release, Jan. 22, 2001, available at http://www.strategisgroup.com/press/pubs/res_hs.htm.

¹⁷ *See Internet users will surpass 1 billion worldwide in 2005*, Feb. 7, 2001, available at <http://www.europemedia.net/shownews.asp?ArticleID=1396>.

¹⁸ *See id.*

¹⁹ *See Mobile Data Penetration to Be Nearly 60% By 2007*, The Strategis Group Press Release, Jan. 29, 2001, available at http://www.strategisgroup.com/press/pubs/mobile_data.htm.

²⁰ *See Internet users will surpass 1 billion worldwide in 2005*, Feb. 7, 2001, available at <http://www.europemedia.net/shownews.asp?ArticleID=1396>.

²¹ *See id.*

International telecommunications conferences over the past decade have recognized the need to allocate 3G spectrum to meet the anticipated demand. In 1992, the World Administrative Radio Conference (“WARC-92”) identified 170 MHz of spectrum for terrestrial 3G wireless services. Last year, the 2000 World Radiocommunication Conference (“WRC-2000”) recognized that further spectrum will be necessary for 3G wireless services, observing that “since WARC-92 there has been a tremendous growth in mobile communications including an increasing demand for wideband multimedia capability.”²² Resolution 223 further states that ITU studies have demonstrated that:

on the order of 160 MHz of spectrum, *in addition to* that already identified for IMT-2000 in No. S5.388 and *in addition to* the spectrum used for first- and second-generation mobile systems in all three ITU Regions, will be needed in order to meet the projected requirements of IMT-2000 in those areas where traffic is highest by 2010.²³

Acting upon these ITU projections of demand for IMT-2000 services, WRC-2000 identified several bands for possible terrestrial IMT-2000 use, including the 1710-1885 MHz and 2500-2690 MHz bands.

²² *Final Acts of the World Radiocommunication Conference* (Istanbul, WRC-2000), Resolution 223, *Additional frequency bands identified for IMT-2000 (WRC-2000)*.

²³ *Id.*, § i.

Motorola agrees with the ITU estimate that more than 160 MHz of spectrum will be needed to support the development of 3G wireless services in the next decade alone. In Europe, the UMTS Forum²⁴ has determined that total spectrum of 342 MHz will be necessary to support the anticipated demand for IMT-2000 services by 2010.²⁵ In addition to the 155 MHz of spectrum that has already been identified for IMT-2000 use in Europe, the UMTS Forum now recommends that “a *minimum* additional frequency spectrum of 187 MHz is required for terrestrial [IMT-2000] services in urban areas by the year 2010.”²⁶ Motorola believes that a similar allocation of spectrum will be necessary in the U.S. to meet demand for 3G wireless services over the next decade. Indeed, the ITU recommendation of an allocation of 160 MHz appears to be conservative when compared to more recent predictions of demand for 3G wireless services.²⁷

There is a pressing need for the Commission to move swiftly to issue new 3G licenses. To date, developments in Europe and Asia have far outpaced the efforts to allocate and license spectrum for 3G services in the U.S. The first 3G wireless licenses were awarded in Finland in March 1999.²⁸ Since then, licenses have been awarded in a number of European countries,

²⁴ The UMTS Forum is a non-profit organization of more than 240 mobile operators, suppliers, consultants, regulatory bodies, media/content providers, and IT companies.

²⁵ See *UMTS/IMT-2000 Spectrum*, UMTS Forum Report No. 6, June 1999, at 29, available at <http://www.umts-forum.org/reports.html>.

²⁶ *Id.* at 4.

²⁷ Motorola notes that the relevant spectrum estimates are premised on implementation of standard 3G technologies. Unlike other countries, the U.S. does not often allocate spectrum for specific technologies. This often leads to inefficiencies that may actually increase that amount of spectrum required.

²⁸ See Thomas Sidenbladh, *Current status of 3G licensing*, Oct. 2000, at 4, available at <http://www.umts-forum.org/ipapers/UMTS-Licensing.pdf> [hereinafter Sidenbladh, *Current status of 3G licensing*].

including the UK, Spain, Germany, the Netherlands, Italy, Austria, Norway, Switzerland, Poland, Sweden, and Portugal.²⁹ Spectrum allocation and licensing have also moved at a fast pace in Asia, where licenses have already been awarded in Thailand, Japan, New Zealand and South Korea.³⁰

The fast pace of development in Europe and Asia, and the lead that these countries are establishing over the United States in the development of 3G equipment and services, may impact the competitive standing of U.S. companies in the global markets for these goods and services.

The CEA identified this cost of delay in an October 2000 report:

Perhaps the most important cost of delay is the forgone benefits from the creation of internationally competitive industry clusters dedicated to 3G products and services. . . . [T]hese clusters are already emerging in Finland and elsewhere. The most important providers of wireline Internet services – firms like AOL, Amazon.com, Yahoo!, and eBay – are located in the United States. For U.S. firms to develop similar leadership in wireless technologies, it is essential that the supporting institutions be developed as quickly as possible.³¹

²⁹ See *id.* at 4-5; *Portuguese 3G licence winners announced*, Dec. 21, 2000, at <http://www.europemedia.net/shownews.asp?ArticleID=1018>; *Sweden: 3G licences awarded, Telia left in the cold*, Dec. 19, 2000, at <http://www.europemedia.net/shownews.asp?ArticleID=1003>; *3G License winners announced*, Nov. 30, 2000 (Norway), at <http://www.europemedia.net/shownews.asp?ArticleID=682>; *Disappointing Austrian UMTS auction*, Nov. 7, 2000, at <http://www.europemedia.net/shownews.asp?ArticleID=79>; *Italian UMTS licences assigned*, Oct. 31, 2000, at <http://www.europemedia.net/shownews.asp?ArticleID=836>.

³⁰ See Sidenbladh, *Current status of 3G licensing* at 7.

³¹ CEA 3G Report at 14.

The CEA noted that a cluster of new technology companies has formed in Finland, which was the first country to license spectrum for 3G wireless services, associated with the development of equipment and applications for this new mobile service.³² It also noted that U.S. companies such as Hewlett-Packard have recently chosen to base their wireless applications development programs there.³³ Economic clusters, such as those forming in Finland, promote further economic growth because the required assets, skills, inputs, and staff are already available, and thus there are low barriers to entry in these areas.³⁴ Accordingly, the necessary response is clear: “[T]o promote a domestic cluster of internationally competitive wireless firms, it is essential that adequate spectrum be made available for commercial use.”³⁵

The UMTS Forum recently reported that “[t]he US will continue to lag in the 3G market due to its lack of 3G spectrum and fragmented approach to the market.”³⁶ Motorola urges the Commission to act quickly to ensure that sufficient spectrum is made available for 3G wireless services and to enable U.S. firms to take the lead in this important new sector of the global economy. While 160 MHz will likely be sufficient for anticipated needs through the year 2010, more will eventually be required. The U.S. should strive to identify and allocate as much spectrum below 3 GHz as possible to accommodate the demand for future generations of consumer wireless services.

³² *See id.* at 12.

³³ *See id.*

³⁴ *See id.*

³⁵ *Id.*

³⁶ *UMTS Report No. 9* at 3.

III. **The 1710-1850 MHz and 2110-2150/2160-2165 MHz Bands Offer the Best Near Term Potential for Supporting 3G Services**

Recognizing that an additional allocation of spectrum is “likely necessary”³⁷ to support anticipated demand for 3G, the *NPRM* focuses on identifying candidate bands for reallocation. In addition to the existing U.S. allocations that support first and second generation wireless systems, the *NPRM* seeks comment on the appropriateness of allocating some or all of the 1710-1850, 2110-2150, 2160-2165 MHz and 2500-2690 MHz bands for 3G.

Working in parallel to the U.S./FCC allocations process is ITU-R Working Party 8F which was established in 2000 to study the overall objectives, applications and technical and operational implementation for the future development of IMT-2000 as well as systems beyond IMT-2000. Within that forum, Motorola has submitted what it considers to be the best solution for promoting the development of IMT-2000 throughout the world. Motorola’s proposed IMT-2000 spectrum plan is intended to: 1) provide sufficient capacity to support near term 3G service goals, 2) support timely regional and global harmonization between PCS and GSM band plans, and 3) facilitate near term evolution of 2nd generation PCS and GSM systems to 3rd generation advanced systems.

In the context of the U.S. spectrum allocations process, Motorola’s band plan proposal would require the allocation of the 1710-1850 MHz and 2110-2150/2160-2165 MHz bands for advanced terrestrial 3G services. This would provide an additional 185 MHz of spectrum within the U.S. and thus satisfy the requirements detailed in Resolution 223 adopted at WRC-2000.³⁸

³⁷ See *NPRM* at ¶ 12.

³⁸ As further described in Section IV of these comments, Motorola believes that it likely will be necessary to devote some portion of this 185 MHz as guard bands to minimize potential interference between adjacent band services.

Further, such actions would be consistent with discussions contained in the *NPRM* where the FCC tentatively concluded that it would be appropriate to at least allocate the 1710-1755 MHz portion of the 1710-1850 MHz band as well as the 2110-2150/2160-2165 MHz bands for new advanced mobile and fixed services including 3G.³⁹ The *NPRM* noted that both the 1710-1755 MHz and 2110-2150 MHz bands are already subject to Congressional auction requirements and are well suited to accommodate new advanced services.⁴⁰ As further explained below, these two bands can easily supplement existing allocations to help provide the needed capacity for 3G systems.

The 1710-1755 MHz and 2110-2150/2160-2165 MHz bands only total 90 MHz or little more than half of the minimum needed within the U.S. for 3G development. As discussed in the *NPRM*, the prime candidates to address this shortfall are the 1755-1850 MHz band and the 2500-2690 MHz bands. While the 2500-2690 MHz is highly desirable mobile spectrum, Motorola does not believe that it offers the same advantages as the 1700 MHz bands. Although 2500-2690 MHz was identified by WRC-2000 as a potential IMT-2000 band, no country has yet implemented any commercial mobile services in the band and, in Motorola's opinion, it is unlikely that any country will deploy IMT-2000 services before 2007 at the earliest. Thus, the band does not offer the same near term potential for spectrum harmonization as does the 1710-1850 MHz band that is now widely used globally for 2nd generation systems.

³⁹ *NPRM* at ¶41, 52.

⁴⁰ *Id.* at ¶40, 50. *See also, Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, FCC 99-354, *Policy Statement*, 14 FCC Rcd 19868 (1999) at ¶ 23.

Also, as noted by the FCC's preliminary study on the availability of the 2500-2690 MHz band, incumbent MDS users will soon have operational systems across the country.⁴¹ The FCC's tentative conclusion is that these fixed terrestrial networks will prevent spectrum sharing with 3G systems in most populated areas of the country.⁴² During the past few months, Motorola has participated in an industry effort to review the current uses of candidate frequency bands for 3G.⁴³ After analysis of the current and planned uses of the 2500-2690 MHz band, it is the collective view of these organizations that co-channel sharing is not feasible between MDS and 3G systems. Therefore, it is unlikely that this band can offer a near term solution for 3G spectrum.

The 1755-1850 MHz band, however, is part of the prime candidate band (1710-1855 MHz) identified at WRC-2000 for global IMT-2000 use. This band is already used in most of the world for mobile services especially 2nd generation GSM services. Operators around the world, however, are transitioning existing networks to offer "2.5G" services using GPRS and Edge technologies. Further, standards activities on UMTS 1800 indicate that a number of countries and operators intend to implement such 3G services in this band.⁴⁴ Given its location below 3

⁴¹ See FCC Staff Report Issued by the Office of Engineering and Technology, Mass Media Bureau, Wireless Telecommunications Bureau, and International Bureau: *Spectrum Study of the 2500-2690 MHz Band: The Potential for Accommodating Third Generation Mobile Systems, Interim Report*, ET Docket No. 00-232, DA 00-2583, released November 15, 2000, at 26-29.

⁴² *Id.* at 39-42.

⁴³ See Joint Comments of the Cellular and Internet Association, the Telecommunications Industry Association, and the Personal Communications Industry Association, ET Docket No. 00-258, February 22, 2001 [*hereinafter Comments of the Association Group*].

⁴⁴ See "Draft report of the 15th TSG RAN WG4 meeting," 3GPP Support Team, 27 January 2001. See also "Work Item sheets - latest situation," TSG-RAN, work item #39 on UMTS 1800, available at ftp://ftp.3gpp.org/TSG_RAN/TSG_RAN/Work_Item_sheets/RAN_Work_items.doc.

GHz, the 1710-1850 MHz band provides the best opportunity to harmonize commercial mobile service worldwide.

Motorola notes that the 1710-1850 MHz band, including the 1710-1755 MHz portion that has already been transferred for new non-Government uses, is extensively used by a number of Government operations that, under existing law, are scheduled to remain in the band indefinitely. Within the 1710-1755 MHz band, these protected Government systems include point-to-point microwave facilities supporting Federal power/utility agencies. An additional 17 locations are preserved for Department of Defense activities. In order for the 1.7 GHz band to be usable for 3G operations, steps must be taken to facilitate the relocation of these systems or to develop appropriate sharing criteria to promote 3G uses in populated areas.

In this regard, Motorola has participated in the development of the *Comments of the Association Group*⁴⁵ that provides an industry analysis on the impact of allocating the 1710-1850 MHz band for 3G services on Federal Government systems. Those comments provide support for Motorola's belief that it is feasible to develop a sharing and relocation strategy that could make most of this spectrum available for the accommodation of 3G services while, at the same time, meeting the needs of the Government users including providing full cost compensation for relocation. Motorola supports the *Comments of the Association Group* and urges the FCC to act accordingly.

The 1710-1850 MHz band would be subject to the proposed mandatory reimbursement policies that are required by the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 ("Thurmond Act"). In the Notice of Proposed Rule Making of ET Docket No. 00-

⁴⁵ See n. 43 *supra*.

221, the FCC proposed a process that would require the NTIA to provide relevant information for unclassified Government facilities, including total cost of relocation, in advance of the relevant auction. For classified government facilities, NTIA would provide more general information focusing solely on the total cost of relocating classified systems from a particular spectrum block and market. Interested bidders would then be able to factor this relocation information into their bidding strategies. The subject *NPRM* referenced these proposals and indicated that they would apply to the 1710-1755 MHz band as well.

Coupled with the FCC's proposals is a companion proceeding initiated by the NTIA to establish its own rules for the compensation of relocated Government operations.⁴⁶ In proposing reimbursement policies, the NTIA seeks comment on: 1) factors for determining comparability of replacement communications facilities, 2) the need for a cost-sharing plan where relocation costs are shared/distributed among affected auction winners, 3) factors and definitions for determining the marginal costs of relocation, and 4) negotiation and mediation processes.

Motorola believes that the current auction system, where the true costs of relocating incumbents only becomes known to successful bidders *after the auction*, threatens the effective deployment of advanced wireless communications systems in a timely fashion. Forcing industry service providers to spend tens of billions of dollars before any investment in infrastructure is not in the best interest of advancing 3G deployment. Motorola believes that the U.S. must develop a regulatory structure whereby the proceeds from the relevant auctions are used to fund the relocation of affected incumbent operations. The amount of the relocation expense must be

⁴⁶ Mandatory Reimbursement Rules for Frequency Band or Geographic Relocation of Federal Spectrum-Dependent Systems, Notice of Proposed Rulemaking, 66 Fed. Reg. 4771 (proposed Jan. 18, 2001).

determined prior to auction of the spectrum and the new licensee required to deposit the funds into the U.S. Treasury account of the Federal entity concerned. These funds would then be available to the Federal entity, subject to the provision of its authorization Acts and appropriations Acts.⁴⁷

While the Thurmond Act clearly states that compensation must be provided for relocation of incumbent Federal users, it makes the availability of the monies subject to authorization and appropriations Acts. This mechanism has the potential to add unnecessary uncertainty and delay with respect to relocation of Federal entities. Efficient and complete compensation of Federal entities could be better facilitated if monies from prospective auctions of reallocated spectrum were used to directly compensate any Federal entity affected by the reallocation. This will help speed implementation of new services in an efficient and effective manner and will give the Federal entities more control over the deployment of new systems.

Any necessary legislation with respect to these compensation issues may take some time to enact. Prior to that time, it is important that all assumed spectrum auction revenues first be dedicated to fully support the communications modernization needs of any Federal entity required to relocate its operations rather than any other Federal program or policy. It is imperative that incumbent users be promptly compensated in order to carry out their ongoing mission and service to the American public. Motorola intends to work with Congress, the FCC and NTIA on these issues during the next few months.

⁴⁷ Section 113 (g)(C) of the NTIA Organization Act

Finally, with respect to the 2110-2150/2160-2165 MHz band, Motorola notes that this spectrum is identified as for use by IMT-2000 systems and is being licensed around the world for this purpose. Already allocated for “emerging technologies”, these bands should be made available in the U.S for 3G as proposed in the *NPRM*. Unlike other administrations around the world, however, Motorola notes that the U.S. allocation is disjointed due to the assignment of MDS channels 1, 2, and 2A at 2150-2162 MHz. Motorola believes that it would be technically beneficial for both the 3G/IMT-2000 and MDS services if the 3G allocation in the 2110-2150/2160-2165 MHz band were consolidated.

The *NPRM* identifies a potential interference situation with 2110-2120 MHz band near the Space Research service installation near Goldstone, California. Operating as an uplink facility for interplanetary spacecraft, the Goldstone transmitters operate with up to 400 megawatts of power, which would affect 3G mobile receivers for a substantial distance. The *NPRM* noted that when faced with a similar circumstance, the Government of Australia excluded the 2110-2125 MHz portion of the spectrum in areas around its deep space network facility at Caneberra in a recent auction of spectrum for IMT-2000.

At this time, Motorola does not have sufficient information to provide an opinion on the ability of 3G to share spectrum in the vicinity of Goldstone. Further technical and operational information is needed on the Goldstone facility before a final decision can be made. For example, before an adequate sharing assessment can be made, it is necessary to understand more specifically the technical parameters of the Goldstone facility including its duty cycle and duration of transmissions. Every effort should be made, however, to develop some sharing criteria that does not preclude the use of this band in the heavily populated areas of Southern California and

the greater Las Vegas area. Motorola intends to work closely with NASA and other relevant government agencies to gain additional knowledge of these operations and urges the FCC to actively participate in the development of a solution that satisfies the needs of both services.

IV. The FCC Should Pair Available 3G Spectrum to Promote Global Harmonization

The importance of harmonization goes beyond promoting global roaming. As a manufacturer of wireless communications equipment, Motorola believes that the bigger issue is the resulting savings in equipment costs through economies of scale and ensuring that advanced services are available and deployed as quickly as possible. Like all organizations, manufacturers have limited resources and will first develop and build technologies for the largest markets in order to maximize return on investment. If the U.S. fails to align its spectrum actions with the rest of the world, it risks being considered as a secondary market and treated as a lesser priority for system development. The resulting delay in 3G deployment would threaten U.S. leadership in the development of competitive industries dedicated to 3G products and services.⁴⁸

Eventually, manufacturing economies benefit operators and consumers through lower costs for equipment and services thus allowing for more wide scale deployment and the provision of services to a greater cross-section of Americans. For these reasons, Motorola believes that it is imperative that the U.S. becomes aligned with broader regional and global IMT-2000 allocations.

In considering these and similar issues, the *NPRM* discusses three pairing options for the candidate 3G frequency bands under consideration in this proceeding.⁴⁹ The three options can be summarized as follows:

⁴⁸ *CEA 3G Report* at 14.

⁴⁹ *NPRM* at ¶¶ 66-69.

Option 1: Pair 1710-1755 MHz with 2110-2150 MHz. As a variation, additional spectrum between 1755-1790 MHz could be paired with “additional spectrum above 2110 MHz.” This option is considered to be consistent with WP 8F proposals made by some Central and South American countries and would provide compatible base-to-mobile use of the 2110-2170 MHz among Region 2 and non-Region 2 countries.

Option 2: Pair 1710-1755 with additional spectrum in the 1755-1850 MHz band. While promising compatibility with many 2nd generation systems in many countries, the principal concern about this option is the availability of Federal Government spectrum above 1755 MHz.

Option 3: Pair 2110-2150/2160-2165 MHz with spectrum in the 2500-2690 MHz band. Alternatively, the 1710-1755 MHz band could be paired with spectrum in the 2500-2690 MHz band. The principal advantage is that this could directly permit 3G compatibility without concerns as to whether 2G systems will be transitioned to 3G.

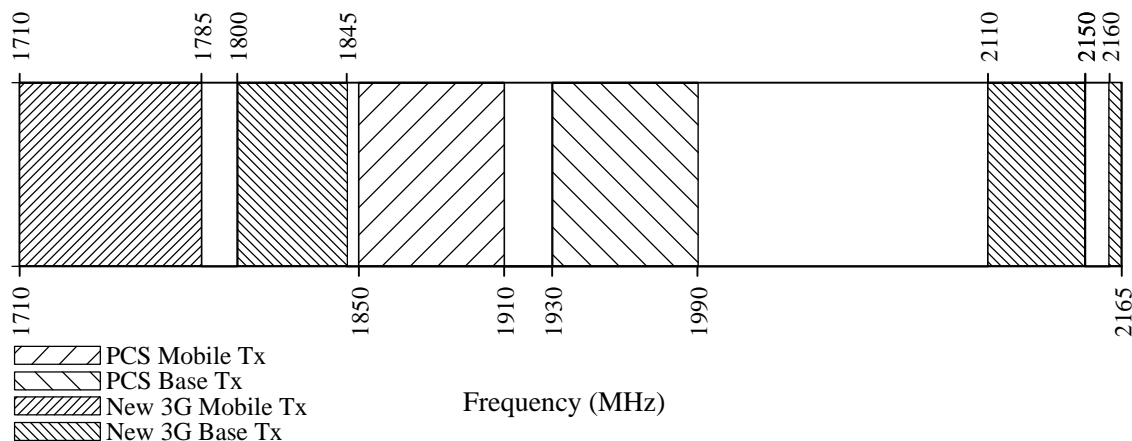
Each of the FCC’s options are logical proposals given the multi-layered challenges associated with 3G allocations. Not only is it difficult to identify at least 160 MHz of spectrum below 3GHz, the targeted spectrum must align with regional and global interests that do not share the unique communications requirements of United States.

While each of the options raised by the *NPRM* has various pros and cons, Motorola believes that, in the final analysis, each is lacking. Most importantly, none of the proposed options appear to provide the requisite amount of bandwidth for 3G services. In the first case, Option 1 considers a total allocation of 90 MHz, well short of the minimum requirement 160 MHz that Motorola believes necessary to promote a competitive domestic 3G market. While Option 1 also contemplates making available additional spectrum from the 1755-1790 MHz, it appears that it consider pairing this spectrum with allocations from the 2.5 GHz band. As noted above, the existing and planned uses of the 2.5 GHz band do not lend itself to the development of

3G services and, thus, the band does not provide a near term 3G spectrum solution in the U.S.⁵⁰ Further, equipment spanning the 1700 and 2500 MHz bands is not used elsewhere in the world and would require substantial development costs to accomplish operating over such a large duplex spacing.

Option 3 also focuses on allocations from the 2.5 GHz MDS/ITFS band. Motorola believes that widespread mobile use of this band in any region of the world is, at a minimum, several years away. Thus, U.S. reliance on this band for 3G deployment would deprive the industry and consumers of any near term benefits of harmonization.

In the ITU-R WP-8F forum, Motorola has been developing a band plan that builds upon the thinking contained in FCC Option 2. The basic configuration of the plan and its implications to the U.S. table of allocations is summarized as follows:



Motorola Proposed Band Plan for U.S. 3G Service

⁵⁰ See page 12, *supra*.

In the first instance, Motorola believes that the U.S. will benefit greatly from a 3G pairing that, in part, is entirely contained within the 1710-1850 MHz. Motorola therefore recommends that the FCC pair the 1710-1755 MHz (mobile station transmit) with the 1800-1845 MHz band (base station transmit). Such an allocation would provide substantial harmonization with DCS-1800 allocations used throughout the world.⁵¹ This proposal would also rely on the standard duplex direction in which the higher frequency portion is the forward, or downstream, direction and the lower frequency portion is the reverse, or upstream, direction. This orientation complies with the standards used for both DCS-1800 and PCS. This will allow similar equipment to be used and lower the cost through greater economies of scale.

In addition, this proposed band plan would pair the 1755-1780 MHz band (mobile station transmit) with the 2110-2150/2160-2165 MHz band (base station transmit). Allocating the 1755-1780 MHz for mobile transmit use provides additional harmonization with 30 MHz of the DCS-1800 mobile station transmit spectrum at 1710-1780 MHz. Allocating the 2110-2150/2160-2165 MHz band for base station transmissions provides harmonization with 45 MHz of the 3rd generation UMTS base station transmit band.

To the extent that additional spectrum from the 1780-1800 MHz band can be made available for non-government uses, this proposed band plan would allocate that spectrum for time division duplex technologies. In order to avoid sharing issues between TDD and FDD systems, it is recommended that TDD uses in that spectrum be limited to low power devices (indoor) similar to the User PCS allocation at 1910-1930 MHz or, otherwise, appropriate guard bands must be implemented.

⁵¹ The European DCS-1800 (GSM) allocation pairs the 1710-1785 MHz band (mobile

This proposed band plan leaves a 5 MHz guard band at 1845-1850 MHz to reduce interference between IMT-2000 and PCS systems. Without a guard band, there is an opportunity for interference from IMT-2000 base stations into PCS base stations and for interference from PCS mobiles into IMT-2000 mobiles. Motorola's preliminary analysis indicates that 5 MHz should be sufficient to minimize potential interference at this spectrum junction to acceptable levels. However, further analysis is needed to determine the adequacy of this guard band. Motorola intends to have the results of preliminary interference simulations ready in time for the submission during the reply comments. During the course of this proceeding, Motorola will continue to evaluate this plan as well as other relevant proposals considering factors such as spectrum efficiency, band sharing feasibility with incumbent users, and the cost and complexity implications of duplex spacing and multi-band operations.

One such plan under further investigation was prepared by the Canadian Government and recently made available at the February 21-29 meeting of ITU-R Working Party 8F.⁵² Similar in structure to the proposal discussed above, it would provide a total of 180 MHz of additional spectrum for advanced wireless services through a variety of technology platforms. Like Motorola's initial proposal, all of this spectrum would in some way be harmonious with global second and third generation allocations. The Canadian proposal is one option that merits serious consideration keeping in mind the need for the U.S. to harmonize its actions with other administrations.

station transmit) with the 1805-1880 MHz band (base station transmit).

⁵² See "Preferred Frequency Arrangements," Canada, ITU-R WP 8F document 8F/240, 15 February 2001.

V. **Conclusion**

The 3rd generation of wireless technology offers tremendous economic and cultural benefits to people throughout the world. If the U.S. is to exert leadership in the development and exportation of 3G services and technologies, sufficient quantities of spectrum must now be made available so that U.S industry can surpass existing efforts in other parts of the world. Motorola urges the Commission to allocate spectrum in a manner that achieves the maximum practicable degree of harmonization between domestic and international spectrum.

Respectfully submitted,

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